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**APPLYING MODELLING IN THE PROCESS  
OF ANTI-CORRUPTION EXPERTISE  
OF LEGAL REGULATION OF PUBLIC  
PROCUREMENT**

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**Keywords:** public procurement, corruption, anti-corruption expertise, the Principal-agent model, quasi-corruption, auction.

**Abstract:** The paper proves a necessity of changing the approach to anti-corruption expertise: the assessment of affordability of the best society's alternative in terms of regulation proposed by the principal (*ex ante* impact assessment) has to be preceded by the analysis of opportunities for *mala fide* agent's behavior and evaluation of incentives for his *bona fide* behavior.

In the paper two different algorithms of anti-corruption expertise have been introduced: the first one is applied to the new regulation tool, the second one – to the regulation tool which has been used and some information on agent's reaction is available. In both cases the expertise starts from the modelling of society's preferences and comparing them with the principal's preferences generated by the proposed regulation.

The second algorithm used by the authors in the anti-corruption expertise applies the price English auction in public procurement.

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## Introduction

In the hierarchy of legal acts, the effect of which is aimed at combating corruption, the highest level document is the United Nations Convention against Corruption, adopted by the resolution 58/4 of the General Assembly on 31 October 2003.

Article 5, paragraph 3 of this document lays the international legal framework for anti-corruption expertise: «Each State Party shall endeavour to periodically evaluate relevant legal instruments and administrative measures with a view to determining their adequacy to prevent and fight corruption».

At the level of Russian Federation (hereafter “RF”), the cornerstone documents regulating the conduct of this kind of expertise are the Federal Law #172-FL “On anti-corruption expertise of legal acts and draft normative legal acts” (hereafter “172-FL”) and the Decree of the Government of the RF № 96 with the same title, which approved the rules and techniques of anti-corruption expertise.

In accordance with Federal law, anti-corruption expertise of normative legal acts and draft normative legal acts carried out “...in order to identify factors, which favor the corrupt behavior of agents, and their subsequent elimination. These factors are the provisions of normative acts (draft laws and regulations), which establish for the law enforcer unreasonably wide margin of appreciation, or the possibility of unjustified use of exceptions to the general rule, as well as provisions dealing with uncertain, intractable, and (or) the onerous requirements for citizens and organizations and those thus creating conditions for corruption” (Article 1).

From the above article, it follows that the subject of anti-corruption expertise is the identification and elimination of the regulation’s provisions, which opens up opportunities for corruption or, more broadly, *mala fide* behavior of law enforcer. Thus, the problem of assessing the quality of the proposed regulation, in the sense of enabling the agents the possibility to choose the best alternative for society currently remains outside the scope of anti-corruption expertise.

It should be noted that the expertise can be aimed at the separate tools introduced by the regulatory act as well at their totality up to the regulatory act in general.

It seems reasonable to separate the anti-corruption expertise of regulatory tools, which have been introduced into the practice for the first time, from the anti-corruption expertise of tools with the accumulated legal practice in the framework of the country's regulation system. For example, anti-corruption expertise of amendments to existing legal acts, applies just to the second case.

In the RF, the “Law on Placement of Orders for Supplying Goods, Executing Works, and Providing Services for State and Municipal Needs” (Federal Law #94-FL, hereafter “PPL-1”), which came into force on 01.01.2006, had introduced auction as the primary procurement method. PPL-1 had originally introduced auction in the face-to-face outcry form, and then, faced with a massive cases of mala fides of suppliers, replaced them with e-auctions. Since by the time of enforcement of the law, Principal had no information about the response to the regulation tool from the agents (contracting authorities), in this case we have anti-corruption expertise of the first type.

By the time of enforcement of the new Russian PPL – Federal Law "On the contract system in the procurement of goods, works and services for state and municipal needs" (Federal Law #44-FL, hereafter “PPL-2”), which came into force on 01.01.2014, there were more than three years of applying of e-auctions and there was a lot of information about their performance. Hence, in this case we can apply anti-corruption expertise of the second type.

In the both case we propose a modified approach to anti-corruption expertise that complements traditional anti-corruption expertise, aimed at identifying opportunities for corrupt behavior and evaluating of incentives for bona fides of agents, with the preliminary stage, at which society’s preferences are modeled and are compared to the principal’s preferences generated by the proposed regulation.

### **Methods, Models and Algorithms**

As a rule, as a methodological framework for modelling corrupt behavior is used the "Principal - Agent" model: “Pathologies in the agency/principal relation are at the heart of the corrupt transaction” (Rose-Ackerman, 2008, 330).

This model was developed for describing processes in the private sector and understands the agency relationship as “a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent” (Jensen and Meckling, 1976, 308). Accordingly, the principal faces the task of shaping a system of incentives for the agent, in which agent's preference relation, defined by a corresponding set of alternatives, coincides with preferences of the principal.

In turn, the starting point for modeling public sector processes is the assumption that to meet public needs, the political elite (principal) delegates some decision-making authority to government agencies or other public entities (agents). In contrast to the private sector, the use of the "Principal - Agent" model in the public sector has its own specifics related to the fact

that in a democracy, the political elite, in turn, is an agent, who elected for the achievement of social objectives. Thus, the ideal preferences in this case are not the preferences of political elites but society's preferences and we have some reasons to denote society as a basic principal.

Assume that the basic principal, the principal, and the agent (hereafter, in the figures mostly, BP, P, and A, respectively) equally identify a set of corresponding alternatives  $\mathcal{A}$ , and on this set their preference orders  $\succeq_{BP}$ ,  $\succeq_P$ ,  $\succeq_A$ , correspondingly, are defined.

*Definition 1 (Ivanov, 2014).* We call that the principal (agent) *mala fide* (MF) if its preference order is different from the basic principal's preference order:  $\succeq_P \neq \succeq_{BP}$  ( $\succeq_A \neq \succeq_{BP}$ ), and *bona fide* (BF) if otherwise.

Consider the problem of anti-corruption expertise of a legal act, enacting a new regulatory tool for which there is no law enforcement practice. Suppose that a set of possible outcomes of the applying of the tool in question can be formalized and that the preference orders of basic principal and principal are defined on this set (hereafter, respectively, BPPO and PPO).

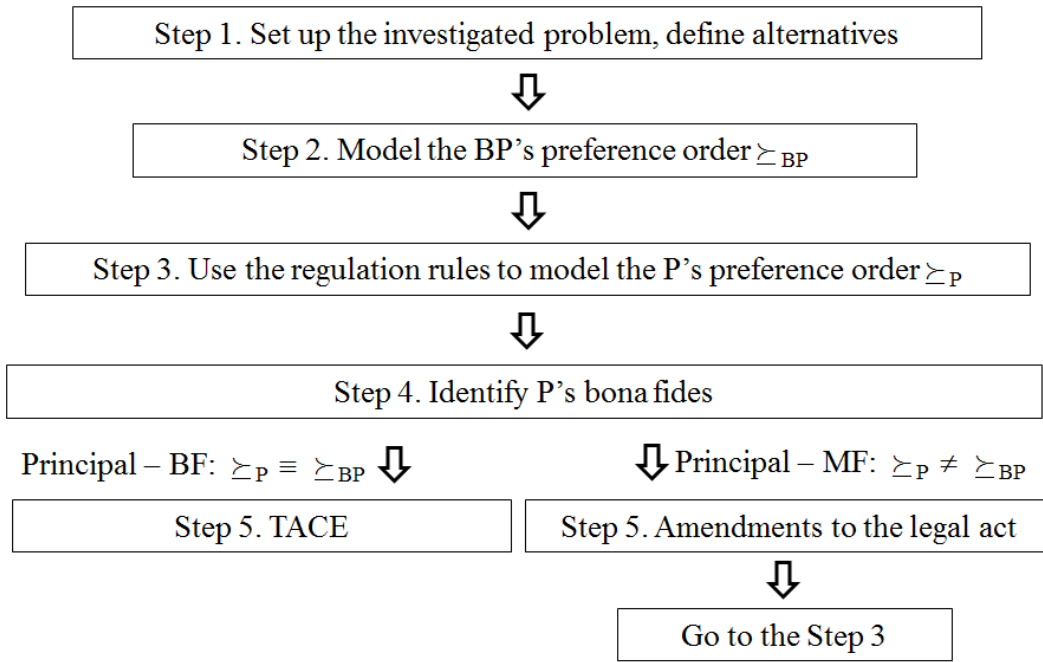
It appears that in this case the first step of anti-corruption expertise is to determine the *bona fides* of the principal. Indeed, if the principal is *bona fide*, the vesting of agent with principal's preference order will inevitably lead to the achievement of public objectives, and otherwise, will not allow of achieving them.

To determine the *bona fides* of the principal is necessary put forward hypotheses about the properties of society's preferences, build a model of BPPO, then, based on the proposed regulation, to model the PPO, and, finally, find out whether they match or differ.

In the first case, tradition anti-corruption expertise (TACE) aimed at the identification and elimination of corruptive factors is further applied, and in the second one it is necessary preliminary to develop appropriate amendments to the legal document in question.

*Definition 2.* Anti-corruption expertise, which includes in its algorithm the identification of the principal's *bona fides*, is called the extended anti-corruption expertise.

Let us depict the algorithm of extended anti-corruption expertise of a new regulatory tool.



**Figure 1. The algorithm of extended anti-corruption expertise of a new regulatory tool**

Let us move on to the consideration of anti-corruption expertise of a legal act that applies regulatory tool for which there is an enforcement practice. The enforcement practice can supply us information for modelling of agent's preference order, and algorithm of extended anti-corruption expertise becomes more complicated than the algorithm shown in *Fig. 1*.

Suppose that, following the steps 1-4 of the above stated algorithm, we have revealed the *bona fides* of the principal. Let us move to the identification of the agency problem's existence.

If the accumulated legal practice does not give us reasons to consider agents as *mala fide*, we obtain the model that is trivial in terms of the agency relationships ( $\succ_P \equiv \succ_A \equiv \succ_{BP}$ ). Let us call this model the conflict-free one: agent has the opportunity to choose and is prone to selection of the optimal alternative for society.

When the assumptions for conflict-free model are true the need for traditional anti-corruption expertise disappears, and researchers tend to focus on the study of the effectiveness of public contracts, trying to identify the most completely sources of agency costs and assess their value (Laffont, Tirole, 1993), (Moszoro, Spiller, 2012).

Assume that the law enforcement practice allows us to identify the existence of agents who violate the rules and, possibly, policies of regulation:  $\succ_A \neq \succ_P$ . They are obviously *mala fide*:

$\succ_A \neq \succ_P \equiv \succ_{BP}$ . Models based on the assumption of principal's *bona fides* and agent's *mala*



*fides* ( $\succ_P \equiv \succ_{BP}, \succ_A \neq \succ_{BP}$ ) are called models of bureaucratic (Jain, 2011, p. 3) or administrative (in the terminology of World Bank) corruption.

Models of bureaucratic corruption are most frequently used in the study of public procurement issues. Actually, in this case the agent is endowed with a discretionary power and a certain budget to carry out procurement. In this situation two of three necessary conditions of corrupt behavior arise (Aidt, 2003, p. F633): the relevant public official possesses the authority to design or administer regulations and policies in a discretionary manner and this discretionary power can allow him the extraction of existing rents or creation of rents that can be extracted.

In the pioneer research based on the assumptions of principal's *bona fides* and agent's *mala fides* Rose-Ackerman examined the situation in which a private individual attempts to corrupt a bureaucrat in order to obtain a government contract (Rose-Ackerman, 1975, p. 187). In this case agent is considered as a potential "bribee," and the actual level of corruption is determined by how well the institutions governing the (corruptible) bureaucracy are designed (Aidt, 2003, p. F635).

Modern studies of bureaucratic corruption develop ideas of Rose-Ackerman's paper and are usually associated with the modeling agency costs and / or analysis of the specificity of the asymmetry of information between involved parties (eg, (Lambert-Mogiliansky, Majumdar and Radner, 2007), (Coppiet, Piga, 2006)).

Thus, if the bureaucratic corruption has identified, modeling the behavior of agents is made to satisfy the aims of traditional anti-corruption expertise: to identify and eliminate opportunities for corrupt behavior and to assess and strengthen the incentives for agent's *bona fides*.

In the bureaucratic corruption model implicitly assumes that the political elite (*bona fide* principal) has developed regulatory rules relying solely on the interests of its principal, society. At the same time, consideration of the political elite as an agent hired by the society, naturally leads us to perception politicians as "...maximizing agents who pursue their own selfish interest rather than as benevolent agents seeking to maximize aggregate welfare" (Grossman and Helpman, 1994, p. 48). Corruption, directly related to activities of the political elite, was called "grand corruption" (Rose-Ackerman, 1996), unlike petty corruption, which is treated in the bureaucratic model.

Trying to develop the typology of corruption models, A. Jain offers to consider examples of corruptive behavior in between bureaucratic corruption and grand corruption as two extreme forms, limiting the scale of corruption activity (Jain, 2011, p. 3).

In the extended anti-corruption expertise of a legal act, involving the use of regulatory tool for which there is certain enforcement practice, improvement the regulation rules, and, possibly, regulatory policy are heavily dependent on the specific agent behavior.

If we reject the assumption of principal's *bona fides* ( $\succeq_P \neq \succeq_{BP}$ ) and continue to consider *mala fide* agent ( $\succeq_A \neq \succeq_{BP}$ ), then, depending on whether the agent is prone to break the existing regulation ( $\succeq_A \neq \succeq_P$ ) or not ( $\succeq_A \equiv \succeq_P$ ), we must distinguish between two types of models.

In the “queue model” (Lui, 1985) and the “auction model” (Beck and Maher, 1986) corrupt bureaucrats try to correct pre-existing government failures. In these models agent's actions violate accepted rules of regulation that allows us to identify differences in preferences of the principal and agent ( $\succeq_A \neq \succeq_P$ ) and, correspondingly, the agency problem existence.

These models, based on assumptions of *mala fides* of both: a principal and an agent form the class of “efficient corruption” models ( $\succeq_P \neq \succeq_{BP}$ ,  $\succeq_A \neq \succeq_{BP}$ ,  $\succeq_A \neq \succeq_P$ ) (Aidt, 2003, p. F633).

As an example of this kind of corruption J. Nye viewed corruption of some factory managers in the Soviet Union, which gave some flexibility to the centralized planning system [Nye, 1967, p. 420], and Laffont and Tirole – some instructions of USA Department of Defense (Laffont, Tirole, 1993, p. 476).

It seems that in the case of an efficient corruption the modeling of agent's behavior must be primarily aim at the identification and elimination the sources of regulation's inefficiency and, accordingly, to the conversion of efficient corruption into the bureaucratic one. In this case, the result of the anti-corruption expertise is a changing of both: regulatory legal acts and policy.

Nevertheless, the principal can create a system of incentives for the agent, which will warn the latter against taking any action in opposition to existing institutions. This kind of model ( $\succeq_P \neq \succeq_{BP}$ ,  $\succeq_A \equiv \succeq_P$ ) can be called a model of totalitarian corruption.

S. Huntington however believed that from the standpoint of interests of society's economic development, effective corruption is even preferable: “In terms of economic growth, the only thing worse than a society with a rigid, over-centralized, dishonest bureaucracy is one with a rigid, over-centralized and honest bureaucracy” (Huntington, 1968, p. 386).

Thus, in the case of a totalitarian corruption anti-corruption expertise should be reduced to a regulatory impact assessment and the identifying of what underlies the ineffective regulation: vertical corruption (Jain, 2001, p. 73-74) or bounded rationality (Simon, 1961, p. xxiv). It should result in a changing of regulatory policy and practices of regulation, especially in terms of the expansion of discretionary powers and responsibilities of agents.

It is easy to note that linear approach of Jain, which limits the scale of corruption activity by the bureaucratic corruption and grand corruption (Jain, 2011, p. 3), is not quite satisfied for constructing the typology of models of corruptive behavior due to, in particular, different forms of grand corruption.

Let us try to construct the typology of models of corruptive behavior, based on combination of assumptions about *bona/mala fides* of principal and agent. We combine the above models in the following table.

Table 1

**The main directions of corrupt behavior modelling**

Principal	Agent	Model Title
Bona Fide $\gamma_P = \gamma_{BP}$	Mala Fide $\gamma_A \neq \gamma_{BP}$	Bureaucratic corruption $\gamma_A \neq \gamma_P$
Mala Fide $\gamma_P \neq \gamma_{BP}$	Mala Fide $\gamma_A \neq \gamma_{BP}$	Efficient Corruption $\gamma_A \neq \gamma_P$
		Totalitarian Corruption $\gamma_A = \gamma_P$
Bona Fide $\gamma_P = \gamma_{BP}$	Bona Fide $\gamma_A = \gamma_{BP}$	Conflict-free model $\gamma_A = \gamma_P$

Analyzing Table 1, we see that is currently being implemented four directions of modeling corrupt behavior of five theoretically possible. We have: BM (principal is *bona fide*, agent is *mala fide*),  $M_1M_2$  ( $M_1 \neq M_2$ ),  $M_1M_2$  ( $M_1 = M_2$ ) and BB.

Let us consider the model MB, based on the assumptions of principal's *mala fides* and agent's *bona fides* ( $\gamma_P \neq \gamma_{BP}$ ,  $\gamma_A \equiv \gamma_{BP}$ ) (Ivanov, 2014).

*Definition 3.* *Bona fide* agent's actions violating the rules of regulation created by the *mala fide* principal will be called quasi-corruptive behavior.

*Definition 4.* The model, which examines *bona fide* agent's behavior in institutional conditions created by *mala fide* principal, will be called quasi-corruption model.

It follows from the definition 3 that in conditions of quasi-corruption agents have discretionary power broader than in totalitarian case. Therefore analysis of the applying of this power may enable us to determine the main directions of the changing of regulatory policy and, respectively, regulation rules

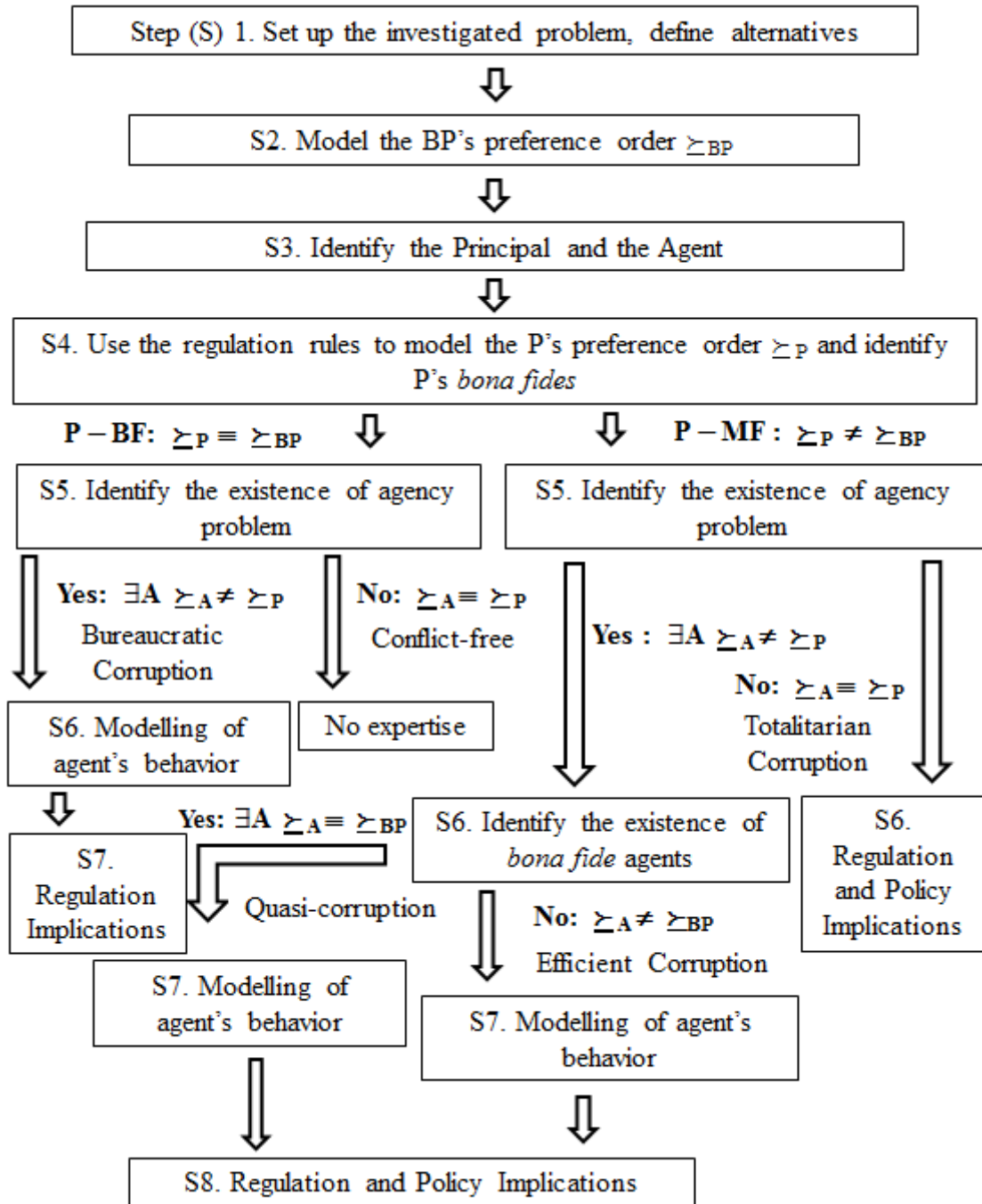
The introduction of the model of quasi-corruption allows us to complete the construction of a typology of models of corrupt behavior, which is based on the methodology of the agency relationships.

Table 2

**The typology of models of corrupt behavior, based on the methodology of the agency relationships**

Principal	Agent	Model Title
Bona Fide $\gamma_P = \gamma_{BP}$	Bona Fide $\gamma_A = \gamma_{BP}$	Conflict-free model $\gamma_A = \gamma_P$
	Mala Fide $\gamma_A \neq \gamma_{BP}$	Bureaucratic corruption $\gamma_A \neq \gamma_P$
Mala Fide $\gamma_P \neq \gamma_{BP}$	Mala Fide $\gamma_A \neq \gamma_{BP}$	Efficient Corruption $\gamma_A \neq \gamma_P$
		Totalitarian Corruption $\gamma_A = \gamma_P$
	Bona Fide $\gamma_A = \gamma_{BP}$	Quasi-Corruption $\gamma_A \neq \gamma_P$

Having finished the construction typology of models of corrupt behavior we can develop the algorithm of anti-corruption expertise of a legal act, which involves the applying of regulatory tool with accumulated enforcement practice (*Fig. 2*).



**Figure 2.** The algorithm of extended anti-corruption expertise of a new regulatory tool with accumulated enforcement practice

## Anti-Corruption Expertise of Applying English Auction in Public Procurement

### 3.1. Step 1: The problem definition

Let us consider a problem of procurement of an indivisible good and suppose that the contracting authority must (or wants to) apply the English price auction (McAfee, McMillan, 1987, p. 702) to procure it.

In the Russian public procurement legislation the English price auction was selected as a preferred procurement method, mandatory for the procurement of goods, works and services included in the special list (hereafter “Auction List”). Sometimes contracting authorities in RF prefer to apply auction (and do not apply tender) in the procurement of other goods trying to avoid third party claims (Moszoro, Spiller, 2012).

Applying Occam's razor (*Numquam ponenda est pluralitas sine necessitate*) to the problem, we can assume that

H1) the basic principal is able

- 1) to formalize the supplied good as a bundle of finite number of its specifications (for the simplicity reasons only, let us include into the bundle the time of delivery, volume and duration of the warranty, operation and, may be, utilization costs and so on)

$$x = (x_1, x_2, \dots, x_n), \quad x_i \in D_i, \quad i = 1, 2, \dots, n, \quad x \in D \subseteq D_1 \times D_2 \times \dots \times D_n,$$

there the Cartesian product  $A \times B$  of sets  $A$  and  $B$  is the set of all ordered pairs  $(a, b)$ , where  $a \in A$  and  $b \in B$ ;

- 2) to point out the feasible sets  $\tilde{D}_i$  for every specification:

$$x_i \in \tilde{D}_i \subseteq D_i, \quad i = 1, 2, \dots, n, \quad x \in \tilde{D} \subseteq \tilde{D}_1 \times \tilde{D}_2 \times \dots \times \tilde{D}_n.$$

Consider the set of outcomes of the procurement procedure

$$A = \{(x, p) \mid x \in D, p \in [0, +\infty)\},$$

where  $x$  is a formalized description of the supplied good and  $p$  is the price by which a contract is awarded. Below we'll call contracts the elements of the set  $A$ .

If the selection stage of an auction gives the only bidder (hereafter terms supplier, producer, and bidder are synonymous as well as public buyer and contracting authorities are synonymous too) with  $x \in \tilde{D}$ , he must be awarded with a contract. Hence set  $\tilde{D}$  can be called the set of ‘quality goods’ or simply quality set. Denote by  $p_0$  the initial (maximum) contract price which should be included into the procurement notice according to the Russian

legislation. Let us introduce into consideration the set  $\tilde{A} = \tilde{D} \times [0, p_0]$ , each point of which  $(x, p)$  is acceptable contract for the basic principal.

Suppose that on the set  $\tilde{A}$  a preference order  $\succeq_{BP}$  of the basic principal (BPPO) is defined. The principal has revealed his preference order  $\succeq_p$  (PPO) demanding from contracting authority to apply the English auction.

There are some questions for discussion below:

- is there on the set  $\tilde{A}$  the most preferable for the basic principal contract  $(x^*, p^*)$ ;
- is there on the set  $\tilde{A}$  the most preferable for the principal contract  $(x', p')$ ;
- is the contract  $(x^*, p^*)$  different from the contract  $(x', p')$ ;
- if the contracts are not the same, what are the social losses associated with the awarding the contract, which is not optimal for society;
- if the contracts are not the same, what *bona fide* agent (public buyer) is going to do.

### 3.2. Step 2: Mathematical modelling of basic principal's preference order

In the previous section we supposed that on the set  $\tilde{A}$  an ideal preference order of society or BPPO  $\succeq_{BP}$  is defined. In this section we are discussing some assumptions on properties of that preference order.

The General Assembly of UN in its Resolution 66/95, adopted on 9 December 2011, recommended to all States use “The Model Law on Procurement of Goods, Construction and Services” (hereafter “Model Law”) in assessing their legal regimes for public procurement and give favourable consideration to the Model Law when they enact or revise their laws.

The Model Law distinguishes the open tender as the main procurement method (art. 28-1). The Federal Law #44 (PPL-2), following best practice, defines tender as “method for determining the supplier, in which the winner is the participant, who offered the most economically advantageous bid” (art. 24-3). This definition is clearly based on the assumption of the completeness of the public buyer preference order, and, the more, that suggests complete an ideal social preferences.

1. BPPO is complete: for any  $a^1, a^2 \in \tilde{A}$ , or  $a^1 \succeq_{BP} a^2$ , or  $a^2 \succeq_{BP} a^1$ , or both simultaneously (Varian, 1992, p. 95).

If  $a^1 \succeq_{BP} a^2$  and  $a^2 \succeq_{BP} a^1$  are true simultaneously, we say that contracts  $a^1$  and  $a^2$  are indifferent each other, and denote it as  $a^1 \sim_{BP} a^2$  (below, to where it can not cause confusion, we omit the index BP).

In turn, Article 53-7 of PPL-2 prescribes: "Based on the results of the evaluation of bids, tender commission assigns to each bid a serial number in order of decreasing of their economic advantage".

Thus, it is assumed that, having a finite number of bids, public buyer can order them as follows:

$$A^{i_1} \succeq A^{i_2} \succeq \dots \succeq A^{i_N}, \quad (1)$$

where  $i_1, i_2, \dots, i_N$  are different indices from the set  $\{1, 2, \dots, N\}$  (below sets of type  $\{1, 2, \dots, k\}$  we denote  $I_k$ ).

As international law on public procurement presume integrity of the public buyer, from (1) and Def. 1 it directly follows that BPPO can be considered as transitive one.

2. BPPO is transitive: for any  $a^1, a^2, a^3 \in \tilde{A}$ , if  $a^1 \succeq a^2$  and  $a^2 \succeq a^3$ , then  $a^1 \succeq a^3$  (Ibid).

Since hypothesis H1 suggests that the bundle of good's specifications contains all specifications essential to the contracting authority, it is natural to assume that, by comparing the two contracts which are equal in the content, terms and cost of delivery, he considers them indifferent each other.

3. BPPO is reflexive: for any  $a^1, a^2 \in \tilde{A}$  such that  $a^1 = a^2$ , then it follows that  $a^1 \sim a^2$ .

Consider the problem of geometric representation of the basic principal's preference order. From properties 3, 2, 1, respectively, follows that

- each acceptable for basic principal contract belongs to the definite set of contracts, which indifferent each other (indifference set of the contract),
- indifference sets of the contracts, which are not indifferent each other, do not intersect,
- basic principal, comparing two indifference sets, knows which of them consists of strictly more preferable contracts.

Thus, given these assumptions, the preferences of the basic principal on the set of acceptable contracts  $\tilde{A}$  can be represented by his indifference map – symbolized set of indifference sets of the subject on which the arrow indicates the direction in which lie strictly more preferred alternatives for him.

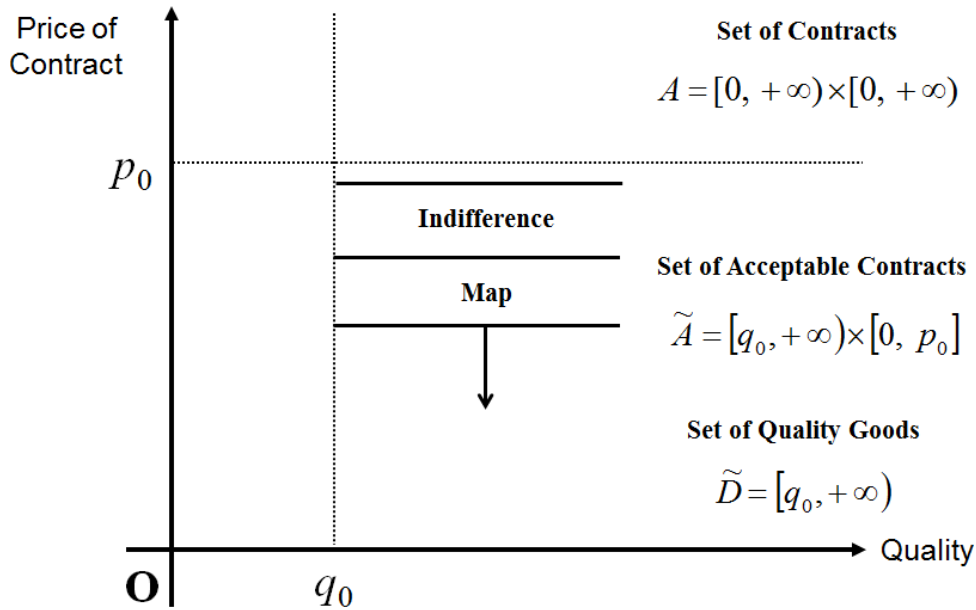
Consider the problem of procurement of homogeneous goods. In this case BP applies the following rule to compare contracts  $a^1 = (x^1, p_1)$  and  $a^2 = (x^2, p_2)$ :

$$\begin{cases} p_1 < p_2 \Rightarrow a^1 \succ a^2, \\ p_1 = p_2 \Rightarrow a^1 \sim a^2. \end{cases} \quad (2)$$

The BPPO (2) is clearly reflexive, complete, and transitive.



It is obvious that BP considers any two contracts, which differ only in the values of qualitative characteristics, indifferent each other, and his indifference map looks like follow (for the sake of simplicity at the Fig. 3 we have left a single numerical characteristic  $x_1=q$ , which stands for quality of purchasing and varies in the set  $[q_0, +\infty)$ ):



**Figure 3. Basic principal's indifference map: the case of homogeneous goods**

Consider a bidding for the purchase of a differentiated goods. We restrict ourselves to the case which considers all qualitative characteristics beginning from the second as selecting criteria. This assumption means that any two acceptable contracts  $((x, p) \in \tilde{A})$ , which differ by values of characteristics  $x_i$  ( $i = 2, 3, \dots, n$ ) only, are indifferent to each other.

Thus, the quality of purchased goods may be described by a single numerical characteristic  $x_1=q$ , and, respectively, any contract can be represented as an ordered pair of numbers:  $a = (q, p)$ . We assume that the contract, which *ceteris paribus* corresponds to the large value characteristic  $q$ , strictly more preferable for the BP.

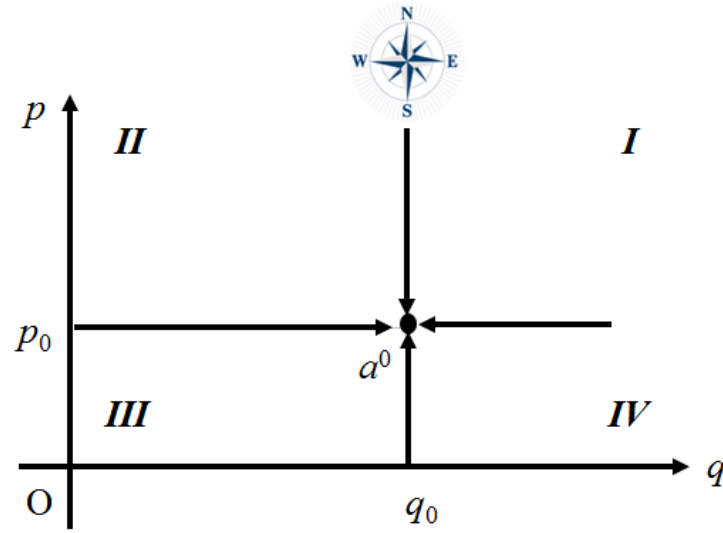
**Definition 5.** We call that contract  $a^1=(q_1, p_1)$  dominates contract  $a^2=(q_2, p_2)$  ( $a^1 \neq a^2$ ), if inequalities  $q_1 \geq q_2$  and  $p_1 \leq p_2$  are true.

4. BPPO is strictly monotonic<sup>i</sup>: if contract  $a^1$  dominates contract  $a^2$  then  $a^1 \succ a^2$ .

Let us consider an arbitrary contract  $a^0 = (q_0, p_0) > 0$  and following four sets of contracts, where  $R^{2+}$  – first quadrant of the Cartesian coordinate system (Fig. 4):

$$I = \{a = (q, p) \in R^{2+} \mid q > q_0, p > p_0\}, II = \{a = (q, p) \in R^{2+} \mid q \leq q_0, p \geq p_0, a \neq a^0\},$$

$$III = \{a = (q, p) \in R^{2+} \mid q < q_0, p < p_0\}, IV = \{a = (q, p) \in R^{2+} \mid q \geq q_0, p \leq p_0, a \neq a^0\}.$$



**Figure 4. Geographical aspects of basic principal's preferences**

According to the definition 5, the contract  $a^0$  dominates all contracts belonging to the region II (the contracts which are located in the north-west (north, west) from it) and is dominated by any contract from the domain IV (the contracts which are located in the south-east (south, east) from it).

Assumption of completeness implies that, when comparing the contracts which do not dominate each other, such as contracts  $a^0$  and any contract  $a=(q, p)$  from the domain I, the BP knows whether he is ready additionally pay  $\Delta p = p - p_0$  for the increase in quality  $\Delta q = q - q_0$  or not.

Since by monotonicity assumption an arbitrarily small increase (decrease) of the contract price (*ceteris paribus*) gives to the basic principal a strictly less (more) preferable contract, the set of indifference, representing his preference order, does not contain interior points, and the term "indifference set" may be replaced by the term "indifference curve".

Thus, contracts, which are indifferent to  $a^0$  (Fig. 4), can be located only in the north-east or south-west from it, and the indifference curves representing BPPO are graphs of strictly monotonically increasing functions.

It is natural to assume that if two contracts are not indifferent for BP then enough small changes in price and quality in the first contract  $a=(q, p)$  (we assume  $q > q_0$  and  $p < p_0$ ) will leave it more (or less) preferable to the second or, other words, that BPPO is continuous.

5. BPPO is continuous (Varian, 1992, p. 95).

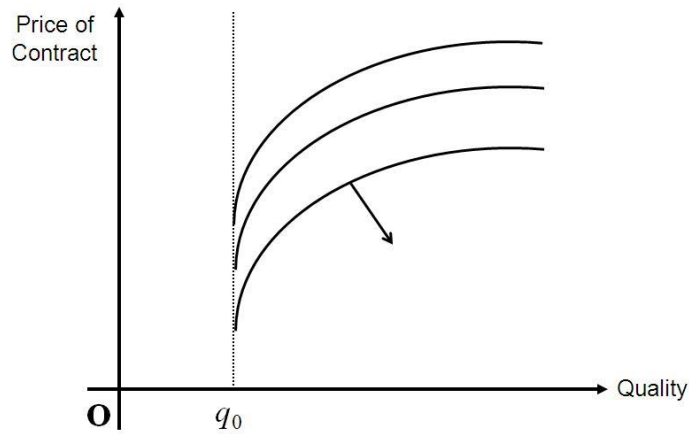
Given assumptions, BPPO can be represented by the utility function  $U=U(q, p)$ , continuous in the set of acceptable contracts (Ibid, p. 97).

6. BPPO is convex: for any acceptable contract  $a^0 \in \tilde{A}$  its better set (upper Lebesgue set)  $B(a^0) = \{a \in \tilde{A} \mid a \succeq a^0\}$  is convex (Ibid, p. 96).

It is easy to prove that given assumptions the convexity of BP's preferences implies concavity of indifference curves.

The latter is coincide with the fact that the public buyer, as a rule, does not like pay extra-money for extra quality or, other words, if the value of qualitative characteristic is gradually increasing by uniform way (along the indifference curve), the corresponding price changes are non-increasing.

Thus, given assumptions, basic principal's indifference curves are the graphs of strictly monotonically increasing, continuous, concave functions and his indifference map looks like follow.



**Figure 5. Basic principal's indifference map: the case of differentiated goods**

It should be noted that the smoothness and strong convexity of BPPO, generally speaking, are not assumed. Indeed, the market consists of a finite number of different groups of differentiated goods, and quality is considered to be the same within each group, BPPO is modeled by family of piecewise constant non-decreasing indifference curves.

7. BPPO is not dependent from the third alternative: preference in any pair of contracts does not change when the set of contracts is changed (leaving affordable the compared contracts).

Given assumption,  $X \subseteq \tilde{A} \Rightarrow \succeq_{BP}(X) \subseteq \succeq_{BP}$ .

From this assumption it follows that if a set of contracts  $X$  is contained in the set of acceptable contracts  $\tilde{A}$ , then BPPO, defined on the set  $X$ , is contained in BPPO, defined on the set  $\tilde{A}$ :  $\succeq_{BP}(X) \subseteq \succeq_{BP}$ .

### ***3.3. Step 3: The identification of the principal and agent***

The main features of the Russian public procurement system were formed under the influence of PPL-1. After the Law took in force, the Ministry of Economic Development was authorized to develop policy in the public procurement (or, other words, to be a Coordinator of public procurement policy) and the Federal Antimonopoly Service – to be a Monitor of the public procurement. The Coordinator and the Monitor, the Bureaucrats in their nature, played a so active role in interpretation and implementation of PPL-1 that we have to identify them closer to the principal than to the agent.

As a result, the Russian Federation developed a system of regulation of public procurement with the aggregate Principal consisting of political and legal elite, Coordinator and Monitor and the aggregate Agent consisting of regional public procurement authorities and bodies governed by public law.

We refer to the regional public procurement authorities as an agent because, on the one hand, they have a very limited discretion power, and, on the other hand, they were authorized not only to coordinate and control regional public procurement but also to act as a public buyer.

### ***3.4. Step 4: Mathematical modelling of the principal's preference order***

Corruption factor is one of the main factors that influenced the development of public procurement system in Russia, along with the lack of procurement academicians and practitioners, as well as the strong administrative resource which enable to realize almost any reform, at least for the relatively short period of time.

As noted by Samuel Huntington, the scale of corruption is well correlated with the rapid economic and social changes (Huntington, 1968, p. 59).

Thus, the major regulatory tools in PPL-1 and PPL-2 were selected to prevent the necessary conditions of corrupt behavior: wide discretionary power of public buyer, rent-seeking behavior and weak institutions (Aidt, 2003, p. F633).

In order to limit the discretionary power of contracting authority in the maximum extent PPL-1 introduced an Auction as the preferred procurement method.

There was compiled a special Auction list which consists of homogeneous (paper, cleaning and so on) and differentiated (cars, engines, drugs and so on) goods, services and works. For goods and services from the Auction list it is impossible to award contract by the criterion of the most economically advantageous offer, Agent must apply an action.

The reverse (English) auction (second-price auction) can be applied in any case, the request for quotation (first-price sealed-bid auction) can be used for small contracts only and, finally,

contracting authorities cannot apply the Dutch or Vickrey auction (McAfee, McMillan, 1987, p. 702) at all.

Let us assume that purchasing goods are included in the Auction list, what excludes the possibility of their acquisition by the open tender, and the order quantity is so large that the goods cannot be purchased by request for quotation.

Given assumptions the principal prescribes the agent to purchase goods by the English auction. Let us consistently take some hypotheses and determine the choice of the public buyer (agent) under the given regulatory rules.

H2) Public buyer defines the set of acceptable product offerings as  $\tilde{D}$ .

Let us suppose that there are  $N$  suppliers who can deliver the goods from this set:

$$x^i \in \tilde{D}, \quad i \in I_N, \quad N \geq 1.$$

H3) Each supplier knows what his own production and delivery costs will be if he wins a contract.

Hereafter we will denote by  $c_i$  the  $i$ -th supplier's economic costs of production (purchase price when buying from a producer) and delivery costs of the procured items (there is no participation cost):

$$c_i = C_i(x^i), \quad x^i \in \tilde{D}, \quad i \in I_N.$$

H4) Public buyer sets the initial (maximum) contract price  $p_0$  such a way that the following inequality is satisfied:  $\max_{i \in I_N} c_i \leq p_0$ .

The last assumption implies that all contracts  $(x^i, c_i)$ ,  $i \in I_N$ , are available contracts to the public buyer.

H5) The set of suppliers  $S$  is an union  $M$  ( $1 \leq M \leq N$ ) of disjoint sets or classes of suppliers:

$$S = S_1 \cup S_2 \cup \dots \cup S_M, \quad |S_i| = n_i, \quad S_i \cap S_j = \emptyset \quad (i \neq j), \quad i, j \in I_M.$$

Here  $|X|$  stands for the number of elements of finite set  $X$ . It is clear that  $\sum_{i=1}^M n_i = N$ .

We denote the set of numbers of suppliers, forming the  $k$ -th class, through  $I^k$ :

$$I^k = \{i_1, i_2, \dots, i_{n_k}\}, \quad k \in I_M.$$

Following (McAfee, McMillan, 1987, p. 705), we assume that any supplier of  $i$ -th class has no information about the costs of the other suppliers of his class, if any, and suggests that latters independently of each other draw their costs from the known probability distributions

$F_i(\mu_i, \sigma_i)$ , defined on  $[\underline{c}_i, \overline{C}_i]$ ,  $i \in I_M$ , and

$$\overline{C}_i < \underline{c}_j, \quad i = 1, 2, \dots, M-1, \quad j = i+1, \dots, M.$$

If  $M=1$ , we have the independent private-values model (Ibid).

If we additionally assume that higher costs implies higher quality, then H5, in turn, implies that the goods of higher quality are supplied by the producers of classes with larger number.

H6) All suppliers are supposed to be rational and risk-neutral.

H7) There is no collusion among suppliers.

H8) There are no dumping suppliers (nobody bids lower his costs).

We will call the suppliers, for whom assumptions H7 and H8 are true, *bona fide* suppliers.

H9) The auction is designed in such a way that each supplier has no information on the participation / non-participation in the auction other suppliers.

*Proposition:* If the principal prescribes to the contracting authority to procure indivisible goods by the English auction and hypotheses H1 – H9 are true, then the principal is *mala fide*.

*Proof:* Given assumptions H1-H2 and H4, there are  $N$  suppliers (bidders) to procure goods.

Let us  $p_i$  stands for the price up to that the  $i$ -th bidder is taking part in auction. We call  $p_i$  the  $i$ -th bidder's strategy. Since all suppliers are supposed *bona fide*, given assumptions H3, H7, H8) the  $i$ -th supplier takes her strategy from  $P_i = [c_i, p_0]$ , and the vector of all bidders strategies looks as follow

$$p = (p_1, p_2, \dots, p_N) \in P_1 \times P_2 \times \dots \times P_N.$$

Let us assume that  $N=1$ . The single bidder takes her strategy from  $P_1 = [c_1, p_0]$ .

The English auction gives to contracting authority contract  $(x_1, p_0)$  which is dominated by the contract  $(x_1, c_1)$ . Since last contract is affordable to BP and strictly more preferable for it (the property 4 of BP's preferences), we have simultaneously:

$$(x_1, c_1) \succ_{BP} (x_1, p_0), (x_1, p_0) \succ_P (x_1, c_1).$$

Thus, the principal is *mala fide*.

Let us assume that  $N>1$  and consider  $k$ -th supplier ( $1 \leq k \leq N$ ). We denote the set of numbers of the remaining suppliers through  $I_{-k}$ :

$$I_{-1} = \{2, 3, \dots, N\}, I_{-k} = \{1, 2, \dots, k-1, k+1, \dots, N\} (1 < k < N), I_{-N} = \{1, 2, \dots, N-1\}.$$

Let us next consider the  $k$ -th bidder's strategy  $p_k = c_k$  and calculate her payoff function:

$$\Pi_k(p_1, \dots, p_{k-1}, c_k, p_{k+1}, \dots, p_N) = \Pi_k(c_k) = \begin{cases} \min_{i \in I_{-k}} p_i - c_k, & \min_{i \in I_{-k}} p_i > c_k, \\ 0, & \min_{i \in I_{-k}} p_i \leq c_k. \end{cases} \quad (3)$$

From (3) it follows that the payoff function is non-negative for the strategy  $p_k = c_k$ , and all strategies of the other bidders.

Since the  $k$ -th supplier

- is a risk-neutral (H6),

- has no information on the participation in the auction suppliers of less quality goods (H9) or belongs to the lowest quality producers,
- has no information of the costs of suppliers of its class (H5),

this fact is a sufficient basis for a decision on the participation in the auction.

For any other strategy of  $k$ -th bidder  $p_k \in (c_k, p_0]$  the payoff function will be the same or less:

$$\begin{aligned} \Pi_k(p_k) &= \Pi_k(p_1, \dots, p_{k-1}, p_k, p_{k+1}, \dots, p_N) = \begin{cases} p_k - c_k, & \min_{i \in I_{-k}} p_i > p_k, \\ 0, & \min_{i \in I_{-k}} p_i \leq p_k. \end{cases} = \\ &= \begin{cases} \min_{i \in I_{-k}} p_i - c_k + \left( p_k - \min_{i \in I_{-k}} p_i \right), & \min_{i \in I_{-k}} p_i > p_k, \\ 0, & \min_{i \in I_{-k}} p_i \leq p_k, \end{cases} \leq \Pi_k(c_k). \end{aligned} \quad (4)$$

Thus,  $p_k = c_k$  is the dominant strategy of the  $k$ -th supplier. Since the similar result is also valid for the other suppliers, they will drop out the auction when the price reaches the level of their costs. So the person with the lowest costs will win at a price equal to the cost of the second-lowest bidder.

Suppose that auction price has approached the value  $\underline{c}_2$ . From this moment, in the auction take part only suppliers of the class number 1. For the sake of simplicity, assume that the costs of suppliers of this class do not decrease with the increase of their numbers, and the lowest cost has just one supplier:  $c_{i_1} < c_{i_2} \leq \dots \leq c_{i_{n_1}}$ .

So the  $i_1$ -th supplier will win auction at a price  $c_{i_2}$ . Accordingly, from the point of view of regulations established by the principal, the most preferred contract is  $(x^{i_1}, c_{i_2})$ :

$$(x^{i_1}, c_{i_2}) \succeq_P (x^i, c_i) \quad \forall i \in I_N. \quad (5)$$

We will assess the contract from the point of view of the basic principal (and *bona fide* contracting authority). Given assumptions the set of affordable to the BP contracts is  $\{(x^i, p_i), c_i \leq p_i \leq p_0, i \in I_N\}$ .

By the property of strictly monotonicity of BP's preferences the following relations are true:

$$(x^i, c_i) \succ_{BP} (x^i, p_i) \quad c_i < p_i \leq p_0, i \in I_N.$$

Let us consider the set  $A_{BP} = \{(x^i, c_i), i \in I_N\}$ . Since BPPO is not dependent from the third alternative, BPPO, defined on the set  $A_{BP}$ , is the constriction of BPPO, defined on the set  $\tilde{A} = \tilde{D} \times [0, p_0]$ , and from (1) we have that the most preferable to the BP contract exists. We will denote it  $(x^j, c_j)$ ,  $1 \leq j \leq N$ :

$$(x^j, c_j) \succeq_{BP} (x^i, c_i), \quad \forall i \in I. \quad (6)$$

From (5) - (6) we have that there are

strictly preferred to BP contracts than the contract which is awarded by applying the English auction:

$$(x^j, c_j) \succeq_{BP} (x^{i_1}, c_{i_1}) \succ_{BP} (x^{i_2}, c_{i_2}).$$

Hence, the preferences of basic principal and principal are not the same ( $\succeq_P \neq \succeq_{BP}$ ), so (definition 1) the latter can be identified as *mala fide*. QED.

### 3.5. Step 5: The agency problem identification

Let us consider some empirical data from the Business Environment and Enterprise Performance Survey (BEEPS), a joint initiative of the European Bank for Reconstruction and Development (EBRD) and the World Bank (Ivanov, 2014, *Tabl. 5.4*).

Table 3

**Corruption in public procurement in Russia in 2008-2011**

Characteristics of corruption	2008	2011
Percentage of firms that attempted to secure government contract (%)	36.4	26.9
Those among them that indicated that an unofficial payment was made in the process (%)	39.9	22.9

Source: (Russian economic report, 2013, p. 31).

We can conclude that a part of suppliers tried to corrupt contracting authorities (first row) and some of them were successful in it (second row). Since as it was mentioned above the PPL-1 had been developed to combat corruption the difference between principal's preference order and agent's preference order exists ( $\succeq_A \neq \succeq_P$ ).

### 3.6. Step 6: The bona fide agents identification

When in 2010-2011 in RF face-to-face auctions were substituted by e-auctions, competitiveness of auctions significantly decreased (Ivanov, 2014, *Tabl. 5.1, 5.3*). Moreover, the problem of auctions, which has not taken place, arose. There are more than a dozen cases in which PPLs recognize that the auction has not taken place, but practice shows that the main reasons in this case are that there is a single bid or there are no bids at all. In particular, in 2011 the total number of auctions which had not taken place due to a lack of bids or receiving a single bid was: in 90% in January, in 86% in February, 87% in March, and 85% in April.

In 2012 the Monitor (FAS) confirmed that related to the applying of auctions in 2011-2012 at least 60% of auctions in that period had not taken place. Some other sources reported about the larger number of such auctions (Ivanov, 2014, *Tabl. 5.3*).



It is clear that the sharp decline in competition in auctions and the significant number of failed auctions cannot be explained by anything other than unscrupulous actions by public buyers restricting competition in favour of a pre-selected “favorite.” On the other hand, the corruption level in RF is significantly lower than 60%.

One possible hypothesis for explaining identified inconsistencies involves assuming the existence of “quasi-corrupt” behavior of the contracting authority. In this hypothesis, competition may be limited by both the *mala fide* and *bona fide* public buyers. The first seeks to obtain bribes, the second tries to achieve other goals.

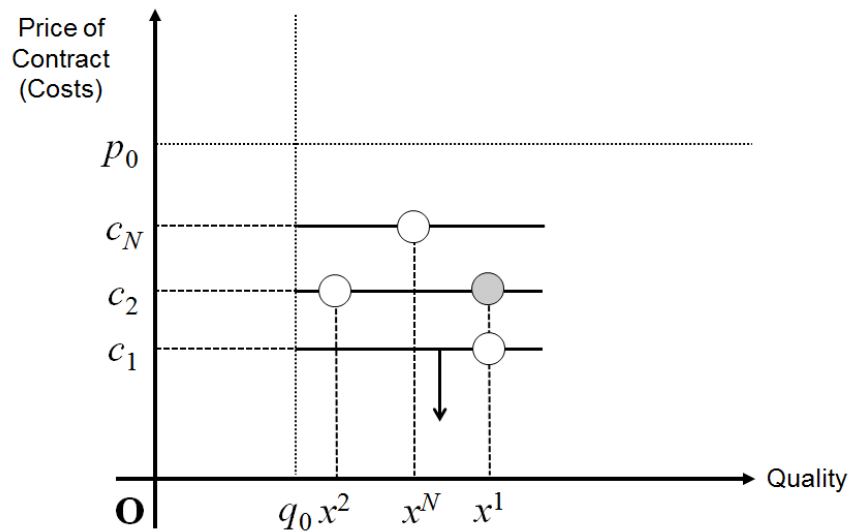
### 3.7. Step 7: The modelling of agent’s behavior

#### 3.7.1. The procurement of homogeneous goods

Consider the problem of procurement of homogeneous goods. In this case:

- there is a sole class of suppliers ( $M=1$ ) consisting of many producers ( $N > 1$ ),
- $L_1 = \overline{C}_1 - c_1$  is relatively small (compared to the cost deviations at the markets of differentiated goods),
- basic’s principal preference order can be represented by indifference map depicted at Fig. 3,
- hypotheses H1-H6 and H9 are usually true.

Let us depict contract  $(x^1, c_2)$  and, symbolically, contracts  $(x^i, c_i)$  ( $i \in I_N$ ) in the coordinate system "Quality" – "Price of Contract (Costs)" and, to identify which one is most preferable to basic principal, use his indifference map.



**Figure 6. Contracts optimal to the Basic Principal and to the Principal:  
the case of homogeneous goods**

It is clear that the contract  $(x^1, c_1)$  is most preferred for the basic principal and dominates the contract  $(x^1, c_2)$  obtained by the English auction:  $(x^1, c_1) \succ_{BP} (x^1, c_2)$ .

Nevertheless, it should be noted that the contract  $(x^1, c_2)$  is more preferred than other contract from the set  $A_{BP}$ :

$$(x^1, c_2) \succeq_{BP} (x^i, c_i) \quad \forall i \geq 2. \quad (7)$$

On the other hand, supplier's surplus  $(c_2 - c_1)$  in the procurement of homogeneous goods can be considered as relatively small.

Indeed, if we assume some additional assumptions about the properties of the functions  $F_1$ , a trivial estimation  $(c_2 - c_1) < L_1$  can be significantly improved.

Assume that costs' distribution is symmetrical in the sense that its median coincides with the midpoint of  $[c_1, \bar{C}_1]$ . We have:

$$P\left(c_2 - c_1 < \frac{L_1}{2}\right) \geq P\left(c_2 < \frac{L_1}{2}\right) = 1 - P\left(c_2 \geq \frac{L_1}{2}\right) = 1 - \prod_{i=2}^N P\left(c_i \geq \frac{L_1}{2}\right) = 1 - \frac{1}{2^{N-1}}. \quad (8)$$

Then, given assumptions, if there are, for example, 5 bidders the probability that  $(c_2 - c_1) < 0.5L_1$  will be not less than 15/16.

Furthermore, if we additionally assume that costs' distribution is uniform or normal we will obtain significantly improved estimation.

In particular, if we assume that costs are uniformly distributed on  $[0, 1]$  then expected value of society losses<sup>ii</sup> will be equal (Stigler, 1961, pp. 214-215):

$$E(c_2 - c_1) = \frac{1}{N(N+1)}. \quad (9)$$

Thus, in the procurement of homogeneous goods the costs of suppliers are close to each other, and we can consider the second-price risk  $(c_2 - c_1)$  as relatively small value. In this case, we can substitute the hypothesis of basic principal's rationality with the suitably constructed hypothesis of his bounded rationality, and ascertain the acceptability of the English auction for the purchase of homogeneous goods.

Moreover, the cost of open tender for procure homogeneous goods, which can permit contracting authority to obtain the most preferred contract  $(x^j, c_j)$ , could surpass the cost of the relevant auction on the amount greater than  $(c_2 - c_1)$ .

When purchasing homogeneous goods the risk of suppliers' *mala fides* connected with their collusion (H7 is violated) is limited due to the limited size of the supplier-favorite's surplus  $(p_0 - c_{favor})$ . Besides this, the *bona fide* contracting authority is able to manage this risk through careful monitoring of prices and setting up corresponding initial contract price  $p_0$ .

When there is only one dumping supplier, for example, with the number of  $k$  ( $k > 1$ ) (H8 is violated), the auction gives to the public buyer contract  $(x^k, c_1)$  that jeopardizes its implementation  $p = c_1 < c_k$ .

Nevertheless, the difference between the supplier's costs  $c_k$  and the contract price  $c_1$ , generally speaking, may be less than the difference between its economic and accounting costs that enables the contracting authority at the relevant transaction costs to achieve proper performance of the contract.

If there are several suppliers, bidding below their costs, *ex ante* estimation of the difference between the costs of the winning supplier and the contract price is not possible. In this case, the auction winner, generally speaking, is not able to satisfy the needs of the public buyer, even when homogeneous goods are purchased.

### 3.7.2. *The procurement of differentiated goods*

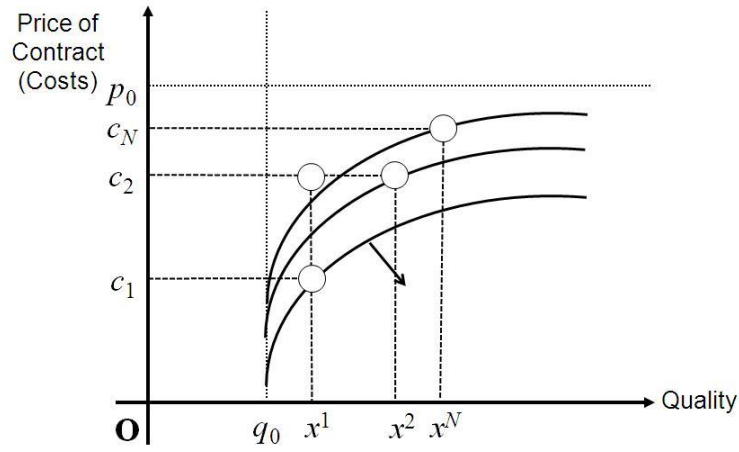
Let us consider the problem of procurement of differentiated goods. These products can be either goods or services (such as cars, medical equipment, drugs, healthcare or educational services or something else) supplied by the producers of different types (public and private organizations, international and domestic firms, and so on).

- there are several classes of suppliers ( $M > 1$  and, correspondingly,  $N > 1$ ),
- $\sigma_i$  are relatively small (to make true H5),
- basic principal preference order can be represented by indifference map depicted at *Fig. 5*.

Below, for the sake of simplicity, we agree to assume that  $|S_i|=1$ ,  $i \in I_M$ , and, correspondingly,  $M=N$ . In this case, in particular,  $c_1 < c_2 < \dots < c_N$  (H5).

From Proposition we have that applying of an English auction gives to the public buyer the contract  $(x^1, c_2)$ .

Let us depict contract  $(x^1, c_2)$  and, symbolically, contracts  $(x^i, c_i)$  ( $i \in I_N$ ) in the coordinate system "Quality" – "Price of Contract (Costs)".



**Figure 7. Contracts optimal to the Basic Principal and to the Principal:  
the case of differentiated goods**

In the case of differentiated goods set  $A_{BP} = \{(x^i, c_i), i \in I_N\}$  is the Pareto-set of basic principal since contracts in this set do not dominate each other: more quality implies more costs.

From the point of view of *bona fide* public buyer (agent) the applying of the English auction when purchasing a differentiated product gives following results.

1. For the basic principal the contract  $(x^1, c_2)$  awarded by means of the English auction is dominated:  $(x^1, c_1) \succ_{BP} (x^1, c_2)$ .
2. In contrast to the case of homogeneous goods formula (7) is not true. Moreover,
  - the contract  $(x^1, c_2)$  is dominated by the contract  $(x^2, c_2)$ ,
  - the contract  $(x^1, c_2)$ , obtained accordingly the regulation rules, *can be* worse of any contract from BP's Pareto set. It is just a case depicted at Fig. 7.
3. Given assumptions, the English auction gives to the contracting authority the goods of worst quality.
4. In contrast to the case of homogeneous goods, the value  $(c_2 - c_1)$  cannot be regarded as sufficiently small. Accordingly, the presence of even a single dumping supplier is a significant threat to the buyer.
5. The quantity  $(c_2 - c_1)$  can be considered, perhaps, only as a lower bound of the social losses, since the latters are also depended on declining of the public customer's effectiveness due to purchasing goods of worst quality (however, Fig. 7 illustrates the fact that the optimal contract may imply the acquisition goods of worst quality.).

Moreover, due to the large number of failed auctions, the real estimation of social losses is not  $(c_2 - c_1)$  but  $(p_0 - c_1)$ . This gives us grounds to say, rather, not about risk, but about the "curse" of the second price.

6. When differentiated goods are purchased, the violation of the informational opacity (H9) leads to that the  $j$ -th supplier leaves the market with other suppliers of high quality goods if  $j > 1$ .
7. Limited number of suppliers in the procurement of differentiated goods increases the risk of collusive bidding. But the Dutch auction, which complicates the implementation of collusion, is not provided by the RF public procurement legislation.

Thus, we can conclude that applying the English auction to the procurement of differentiated goods poses a number of risks to a *bona fide* public customer which he can eliminate, limiting competition in the auction in favor of the pre-selected supplier.

### **3.8. Step 8: Regulation and Policy Implications**

Risks in the procurement of differentiated goods by means of the English auction, which were discussed in the previous section, do not permit to the *bona fide* public buyer obtain the most preferred to him contract. They create strong incentives to restrict competition in the procurement process by means of manipulating in the description of the subject matter of the procurement, the term of the contract, abusing information, etc.

It seems that the scale of such quasi-corrupt behavior can be significantly reduced in RF by taking the following measures.

1. To designate in the invitation to the auction the minimum number of suppliers required to register for the auction in order for the auction to be held (Model Law, 2011, art. 53-j).  
This measure, very likely, will promote competition in auctions and with no doubts will remove a new oxymoron "one-bidder-auction" from the Russian language. Besides, we can improve auction's performance in the procurement of homogeneous goods too since it heavily depends on the participants number ((8)-(9)).
2. To eliminate the contradictions in the Russian public procurement legislation that impede the implementation of scoring auctions and handicap auctions (Arrowsmith, 2005), which give the possibility of compensating the higher contract price by the higher quality of the purchased goods (Model Law, 2011, art. 53-g, Classical Directive 2004/18/EC, art. 51-2).
3. To prevent *mala fide* suppliers from the collusion, to introduce the Dutch auction into the list of acceptable procurement methods.

Dutch e-auction has several advantages compared with the English e-auction:

- it does not demand the auction step,

- it need not the shutting time,
  - and, most importantly, it is a proven means of limiting opportunities for collusion of suppliers.
4. To prescribe the procuring entity to present a statement of the reasons and circumstances upon which it relied to justify the use auction (Model Law, 2011, art. 28-3).
  5. To significantly increase the price thresholds to reduce the scope for quasi-corrupt behavior<sup>iii</sup>.

### **Concluding Remarks**

The paper proves a necessity of changing the approach to anti-corruption expertise: an analysis of opportunities for *mala fide* agent's behavior and evaluation of incentives for his *bona fide* behavior have to be completed by the assessment of possibility of making a best choice for the society in terms of regulation proposed by the principal (*ex ante* impact assessment).

In the paper two different algorithms of anti-corruption expertise have been introduced: first one is applied to the new regulation tool (*Fig. 1*), second one – to the regulation tool which has been used and some information on agent's reaction is available (*Fig. 2*). In both case the expertise starts from the modelling of society's preferences and comparing them with the principal's preferences generated by the proposed regulation.

The paper refines the typology of models of corrupt behavior (*Tabl. 2*), based on the methodology of the agency relationships, proposed in (Ivanov, 2014), and clarifies interdependence between type of corruption and aims of agent's behavior modelling in the process of extended anti-corruption expertise.

The implementation of main steps of the algorithm of extended anti-corruption expertise of a new regulatory tool with accumulated enforcement practice (*Fig. 2*) continue the above cite research (Ibid) where quasi-corruption model was introduced and applied to the examining of case of using English auctions in RF public procurement.

And an implementation of the second algorithm for the different issued of public procurement (the scoring rules, the level of price thresholds and so on) at the agenda.

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<sup>i</sup> This definition differs from the traditional definition of strong monotonic preference order (Varian, 1992, p. 96); however, since it does not lead to confusion, the name of the property has not changed.

<sup>ii</sup> Since homogeneous goods are indifferent to each other, in the procurement of them social losses are equal to supplier’s surplus.

<sup>iii</sup> On January 1, 2006 Russia's price threshold was 78 times below the price threshold established by the EU for government bodies (€137000); at present (November 7, 2014) the threshold is about 80 times below.